

# Preliminary Findings Report No. 5

## NYSERDA Energy Efficient Indoor Air Quality Analysis

November 25<sup>th</sup>, 2020

**Note:** All *italicized* text is duplicate content from prior reports, repeated for reference

### *Executive Summary*

Syska has been engaged by NYSERDA to evaluate the engineering feasibility, energy usage and operational cost impact of making indoor air quality (IAQ) improvements to existing buildings and spaces. The overall effort is split across two separate studies: a commercial office tenant in Manhattan and a commercial office building operator/occupier in Westchester. The studies focus on assessing COVID-mitigating improvements to building systems and operations that also incorporate energy efficiency without sacrificing safety or indoor air quality.

### *Existing Conditions*

Below is a summary of the existing building characteristics and building systems for each project.

#### *Study 1 – Manhattan Commercial Office Tenant*

<i>Number of Floors</i>	<i>6</i>	<i>Peak Occupants (pre-COVID)</i>	<i>800</i>
<i>Project Gross Floor Area</i>	<i>186,000 Square Feet</i>	<i>Typical Operating Hours</i>	<i>8am through 8pm</i>
<i>Location</i>	<i>Midtown Manhattan</i>	<i>Current Occupancy %</i>	<i>2%</i>
<i>Heating System(s)</i>	<i>The tenant's floors are heated by a perimeter fin-tube radiator system outfitted with new control valves supplied by the landlord. Hot water is supplied by the landlord's boilers and routed through risers located at the perimeter columns.</i>		
<i>Cooling System(s)</i>	<i>The tenant's floors are cooled using base building supply air from two main air risers located at the buildings core. Cooling air is supplied to these floors from two variable volume AHUs. These AHUs with VFDs each provide approximately 67,000 CFM and are the main source of cooling for half the building. Chilled water is produced by 3 Chillers located in the basement totalling approximately 2,700 Tons. This chilled water is split between the AHUs that serve the lower levels and upper floor AHUs.</i>		
<i>Ventilation System(s)</i>	<i>Ventilation air is introduced via the main AHUs providing supply air to the tenant floors. The actual amount of outside air varies depending on outside conditions, but the landlord estimates the OA rate to be approximately 4,500 CFM per floor.</i>		
<i>Domestic Hot Water System(s)</i>	<i>DHW is provided by the landlord to the main core restrooms. Additional DHW for the pantries and additional tenant restrooms is provided by the tenant under-counter instantaneous water heaters and above ceiling storage type water heaters.</i>		
<i>Building Management System / HVAC Controls</i>	<i>All landlord and tenant equipment is connected to the base building BMS which is a Reliable Controls system and maintained by the landlord's automated controls contractor. Each tenant has visibility to the BMS for their HVAC terminal unit setpoints, leak detectors, CRAC/AC unit failures, etc</i>		



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### Study 2 – Westchester Commercial Office Facility

Number of Floors	3 & Parking Garage	Peak Occupants (pre-COVID)	2,828
Project Gross Floor Area	627,000 Square Feet	Typical Operating Hours	5am – 6pm Mon-Fri
Location	Westchester	Current Occupancy %	10
Heating System(s)	<i>The site is heated by (3) 300 HP boilers which provide steam and hot water to heating and reheat coils in the central air handling units and VAV/FPBs throughout the office spaces. The perimeter is heated with supplemental constant volume fans and steam coils.</i>		
Cooling System(s)	<i>The site is cooled via water-cooled chiller plant, with (3) 800-ton cooling towers and a total 2,100 tons of chiller capacity. The chiller plant provides chilled water to the cooling coils of all air handling units. The perimeter is cooled as needed with supplemental constant volume fans and chilled water coils.</i>		
Ventilation System(s)	<i>Supply and ventilation air to the occupied areas is provided by large central air handlers, some variable volume some constant volume.</i>		
Domestic Hot Water System(s)	<i>DHW is generated via heat exchangers on the steam supply from the space heating boilers which is stored in a domestic hot water tank which then supply the plumbing fixtures.</i>		
Building Management System / HVAC Controls	<i>The ventilating and air handling units are controlled via a central BMS which monitors status of all fans and coils as well as other setpoints, including OA damper open %, fan power, supply pressure and supply and return air temperatures.</i>		



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## Progress Summary

Study 1 – Commercial Office Tenant – 186,000 GSF (Manhattan, NY)		Study 2 – Large Commercial Office Facility – 627,000 GSF (Westchester, NY)	
Current Project Stage:	<i>Data Collection and Site Surveys</i>	Current Project Stage:	<i>Data Collection and Site Surveys</i>
	<i>IAQ Measure Feasibility Analysis</i>		<i>IAQ Measure Feasibility Analysis</i>
	<i>Energy and Cost Impact Analysis</i>		<i>Energy and Cost Impact Analysis</i>
	<i>Draft IAQ and Energy Study Report</i>		<i>Draft IAQ and Energy Study Report</i>
	<i>Final IAQ and Energy Study Report</i>		<i>Final IAQ and Energy Study Report</i>
	<i>Overarching IAQ Report and Key Findings Slides</i>		<i>Overarching IAQ Report and Key Findings Slides</i>

- Draft of final IAQ and Energy Study report in progress, will summarize findings of past interim reports plus include additional calculations and findings.

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- The CONTAM software is being investigated to run more complex IAQ performance scenarios to inform the decisions around the location and inclusion of zone-level air cleaners.



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## New Findings to Date

Study 1 – Manhattan Commercial Office Tenant

Study 2 – Westchester Commercial Office Facility

- No new findings to currently report, final report shall include summary of all findings and key recommendations on implementing ASHAE’s recommendations for improved IAQ and reduced biohazard risk in a more energy efficient way.

## Barriers Encountered

Study 1 – Manhattan Commercial Office Tenant

Study 2 – Westchester Commercial Office Facility

- No new barriers to currently report, final report shall include summary of all barriers encountered.

## Lessons Learned

Study 1 – Manhattan Commercial Office Tenant

Study 2 – Westchester Commercial Office Facility

- No new lessons learned to currently report, final report shall have a summary of all lessons learned.

## Proposed Work Plan Adjustments

Study 1 – Manhattan Commercial Office Tenant

Study 2 – Westchester Commercial Office Facility

- No new adjustments to work plan



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## Next Steps

### Study 1 – Manhattan Commercial Office Tenant

- Complete additional energy and IAQ calculations and complete draft of Final Report
- Investigate method to estimate % SARS-CoV-2 after a single pass under a UV-C based UVGI system in ductwork.
- Anticipated final IAQ report submission date: 12/11/20

### Study 2 – Westchester Commercial Office Facility

- Complete additional energy and IAQ calculations and complete draft of Final Report. Additional considerations to include:
  - Flushout vs 2 hrs before/after vs 3 Air Changes
  - Show fan energy vs pressure drop for MERV 8/13/16
  - Higher RH setpoint as an energy saving IAQ strategy
  - Inclusion of HEPA filtration in calculations
  - Inclusion of IAQ and energy effects of in-room UVC equipped air cleaners for open offices, private offices, and conference rooms
  - Investigation of reduced occupancy (with reduced over-ventilation to match) as an energy saving IAQ strategy
- Draft report to attempt to calculate % reductions in risk or airborne concentrations of biohazards removed measure by measure in sequence at a typical AHU, including the minimal effects of UV-C on the air stream
- Anticipated final IAQ report submission date: 12/11/20

